



# PATENT SPECIFICATION

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SPECIFICATION NO. 666247

INVENTOR: - EDWARD JOHN MARSHALL

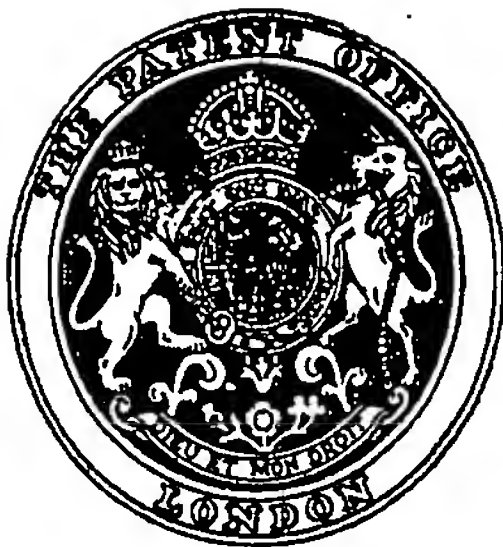
By a direction given under Section 17(1) of the Patents Act 1949 this application proceeded in the name of Arthur Kennedy Dorman, a British subject, of Byeways, Mill Road, Sawston, Cambridge.

THE PATENT OFFICE,  
25th January, 1952.

DS 7090/1(18)/3278 160 1/52 R

- 5 do hereby declare the invention for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—
- 10 The present invention relates to a spray nozzle. It may be used for example for the spraying of trees, crops or other objects with liquids for insecticidal control purposes or for applying coating compositions. The
- 15 spray nozzle may also be used for spraying or cleansing cattle.
- An object of the invention is to provide a nozzle which can be adjusted as desired to give a wide cone of fine spray or a concentrated jet, or a spray intermediate between these extremes.
- 20 According to the invention there is provided an adjustable nozzle for spraying liquids comprising a hollow outer member and an inner member adapted to be located within the outer member, in which the hollow
- 25 outer member has a liquid-outlet orifice communicating with a conical interior surface that forms a valve seating for the inner member which is similarly conically surfaced on its outside, and in which the inner
- 30 member has an axial bore adapted for communication with a source of liquid supply, a plurality of radial passages extending from said bore to the exterior of the inner member, and one or more inclined bores extending at
- 35 an angle from said axial bore and leading towards the orifice in the outer member, the inner member being movable in an axial direction with respect to the outer member, the arrangement and disposition of parts
- 40 being such that, when the inner member seats on the conical valve seating of the outer member, liquid may pass up the angularly-extending bore or bores to produce
- solid jet or cone.
- 50 Preferably, the conical surface of the inner member has a flattened apex forming a surface in which the inclined bores terminate.
- The accompanying drawing is an axial section of one form of nozzle incorporating the invention. The nozzle is formed of
- 55 three main parts, a base member 10 having a screw thread 11 for attachment to a supply pipe, a hollow inner member 12 having an externally screw-threaded extension 14 for engagement with a female thread provided
- 60 in an axial bore 15 of the base member 10, and a hollow outer member 16 having internal screw threads 17, co-operating with an external thread on the base member 10
- 65 to provide adjustment in an axial direction between the inner and outer member 12 and 16. The inner member 12 has its end formed as a truncated cone 18. Between the coned end 18 and the screw thread by which
- 70 it is mounted, the inner member has a hexagonal flange 19 adapted for engagement by a spanner. The corners of this flange are rounded for guiding co-operation with the bore 23, which forms the main cavity, of
- 75 the outer member 16. In order to supply liquid to the interior of the outer member 16, radial bores 20 extend from the middle of each hexagon side to an axial bore 13 of the inner member. The bore 13 is open to the
- 80 bore 15 of the base member to which liquid is supplied. The leading end of the inner member 12 is flattened as shown at 21, and a number of spray-producing passages are formed by bores 22 extending from the flat
- 85 end surface 21 to the bore 13 of the inner member. These bores are spaced from and oblique to the axis of the nozzle so as to impart a swirl to the spray produced by them.
- 90 In order to inhibit leakage between the base

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Index at Acceptance :—Class 69(iii), I(5 : 9).

## COMPLETE SPECIFICATION.

## Improvements in or relating to Adjustable Nozzles for Spraying Liquids.

We, EDWARD JOHN MARSHALL of 18, Milford Street, Cambridge, and ARTHUR KENNEDY DORMAN of Byeways, Mill Road, Sawston, Cambridge, both British Subjects, do hereby declare the invention for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement :—

The present invention relates to a spray nozzle. It may be used for example for the spraying of trees, crops or other objects with liquids for insecticidal control purposes or for applying coating compositions. The spray nozzle may also be used for spraying or cleansing cattle.

An object of the invention is to provide a nozzle which can be adjusted as desired to give a wide cone of fine spray or a concentrated jet, or a spray intermediate between these extremes.

According to the invention there is provided an adjustable nozzle for spraying liquids comprising a hollow outer member and an inner member adapted to be located within the outer member, in which the hollow outer member has a liquid-outlet orifice communicating with a conical interior surface that forms a valve seating for the inner member which is similarly conically surfaced on its outside, and in which the inner member has an axial bore adapted for communication with a source of liquid supply, a plurality of radial passages extending from said bore to the exterior of the inner member, and one or more inclined bores extending at an angle from said axial bore and leading towards the orifice in the outer member, the inner member being movable in an axial direction with respect to the outer member, the arrangement and disposition of parts being such that, when the inner member seats on the conical valve seating of the outer member, liquid may pass up the angularly-extending bore or bores to produce

a fine spray from the outlet orifice and when the inner member is displaced from said seating liquid passes along the radial passages and is discharged from the outlet orifice in a solid jet or cone.

Preferably, the conical surface of the inner member has a flattened apex forming a surface in which the inclined bores terminate.

The accompanying drawing is an axial section of one form of nozzle incorporating the invention. The nozzle is formed of three main parts, a base member 10 having a screw thread 11 for attachment to a supply pipe, a hollow inner member 12 having an externally screw-threaded extension 14 for engagement with a female thread provided in an axial bore 15 of the base member 10, and a hollow outer member 16 having internal screw threads 17, co-operating with an external thread on the base member 10 to provide adjustment in an axial direction between the inner and outer member 12 and 16. The inner member 12 has its end formed as a truncated cone 18. Between the coned end 18 and the screw thread by which it is mounted, the inner member has a hexagonal flange 19 adapted for engagement by a spanner. The corners of this flange are rounded for guiding co-operation with the bore 23, which forms the main cavity, of the outer member 16. In order to supply liquid to the interior of the outer member 16, radial bores 20 extend from the middle of each hexagon side to an axial bore 13 of the inner member. The bore 13 is open to the bore 15 of the base member to which liquid is supplied. The leading end of the inner member 12 is flattened as shown at 21, and a number of spray-producing passages are formed by bores 22 extending from the flat end surface 21 to the bore 13 of the inner member. These bores are spaced from and oblique to the axis of the nozzle so as to impart a swirl to the spray produced by them. In order to inhibit leakage between the base

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and the outer member in any position of adjustment, a packing gasket 24 of rubber or similar material in the form of a cup with a tapered edge co-operates with the bore 23 of the outer member 16. Its flat portion is clamped between the opposed ends of the inner and base members. The outer member has a delivery orifice 25 on the axis of the nozzle, the orifice being extended inwardly by an internal conical surface 27 which is of the same angle as the cone surface 18 on the end of the inner member 12. The outer portion 26 of the delivery orifice may be chamfered as shown.

When the outer member 16 is turned to cause the inner and outer members to move towards each other, the coned portion 18 of the inner member 12 enters the coned seat 27 at the delivery orifice 25. In the extreme position, the coned surfaces 18 and 27 meet, leaving only the bores 22 to carry liquid to the orifice 25, resulting in the formation of a fine spray. As the outer member 16 is unscrewed to increase the separation of the coned surfaces, the volume and concentration of the spray are increased progressively until a solid jet is delivered.

The embodiment herein described and illustrated may be modified in various respects. For example the passages 22, which extend through the body of the valve element, may be supplemented by grooves formed in the cone surface. It is also to be understood that the invention is not limited to the use of a screw to control the axial relative movement of the inner and outer members and that other equivalent means may be provided for this purpose. The outer member may if desired be made as a sleeve which is adjustable in an axial direction, the position of the sleeve being controlled manually, or locking means may be provided for this purpose.

What we claim is:—

1. An adjustable nozzle for spraying

liquids comprising a hollow outer member and an inner member adapted to be located within the outer member, in which the hollow outer member has a liquid-outlet orifice communicating with a conical interior surface that forms a valve seating for the inner member which is similarly conically surfaced on its outside, and in which the inner member has an axial bore adapted for communication with a source of liquid supply, a plurality of radial passages extending from said bore to the exterior of the inner member, and one or more inclined bores extending at an angle from said axial bore and leading towards the orifice in the outer member, the inner member being movable in an axial direction with respect to the outer member, the arrangement and disposition of parts being such that, when the inner member seats on the conical valve seating of the outer member, liquid may pass up the angularly-extending bore or bores to produce a fine spray from the outlet orifice and when the inner member is displaced from said seating liquid passes along the radial passages and is discharged from the outlet orifice in a solid jet or cone.

2. A nozzle as claimed in Claim 1, in which the conical surface of the inner member has a flattened apex forming a surface in which the inclined bores terminate.

3. A nozzle as claimed in Claim 1 or 2 in which the inclined bores are spaced from and oblique to the axis of the nozzle so as to impart a swirl to the spray produced by them.

4. An adjustable nozzle for spraying liquids substantially as described with reference to the accompanying drawing.

Dated this 6th day of December, 1949.

BARON & WARREN,  
16, Kensington Square,  
London, W.8.  
Chartered Patent Agents.

#### PROVISIONAL SPECIFICATION.

#### Improvements in or relating to Adjustable Nozzles for Spraying Liquids.

We, EDWARD JOHN MARSHALL of 18, Milford Street, Cambridge, and ARTHUR KENNEDY DORMAN of Byeways, Mill Road, Sawston, Cambridge, both British Subjects, do hereby declare the nature of this invention to be as follows:—

The present invention relates to a spray nozzle. It may be used for example for the spraying of trees, crops or other objects with liquids for insecticidal control purposes or for applying coating compositions. The spray nozzle may also be used for spraying or cleansing cattle.

An object of the invention is to provide a

nozzle which can be adjusted as desired to give a wide cone of fine spray or a concentrated jet, or a spray intermediate between these extremes.

According to one aspect of the invention a spray nozzle comprises a hollow outer member provided with an orifice, the internal surface of the member surrounding the orifice being of conical form, and an inner member having a coned end and which is movable relatively towards and away from and substantially in axial alignment with the orifice, the inner member being provided with one or more grooves along its coned



surface. If desired the grooves may be replaced by one or more holes formed adjacent to the coned end and extending inwardly to the end of the inner member.

5 When the coned end of the inner member is close to or in contact with the coned surface of the outer member a fine widely dispersed spray is produced, some or most of the liquid passing through the grooves or  
10 holes in the inner member. When the coned surfaces of the inner and outer members are widely separated a concentrated jet is produced. Intermediate positions of adjustment give sprays with intermediate spread.

15 A feature of the invention consists in arranging the grooves or holes so that they are inclined to a plane passing through the axis of the nozzle so that a swirl is imparted to the liquid passing through them.

20 A further feature consists in making the angle of the coned end of the inner member similar to that of the angle of the coned surface surrounding the discharge orifice to enable a close fit to be obtained between  
25 these surfaces.

According to another aspect of the invention a spray nozzle comprises a hollow outer member provided with an axial discharge orifice, the internal surface of the member  
30 surrounding the orifice being of conical form, a hollow inner member having a conical end and which is movable relatively towards and away from and substantially in axial alignment with the orifice and having apertures  
35 to connect its interior with a surrounding enclosed space in communication with the discharge orifice and means permitting relative axial movement between said inner and outer members and a packing to inhibit  
40 leakage through said means. Advantageously grooves or holes are formed in the inner member as above described.

In one construction in accordance with the invention a nozzle is formed of three main  
45 parts, a base member having a screw thread for attachment to a supply pipe, a hollow inner member externally screw threaded for engagement with a female thread extending through the base member and a hollow outer  
50 member, internally threaded, co-operating with an external thread on the base member to provide adjustment in an axial direction between the inner and outer members. The inner member has its end formed as a trun-

cated cone the surface of which has inclined  
55 grooves formed in it. Between the coned end and the screw thread by which it is mounted, the inner member has a multiplicity of small radial holes drilled in it to  
60 communicate with the central bore to which liquid is supplied. The outside diameter of the inner member may be reduced in the region of these holes. The outer member has an internal thread for co-operation with  
65 that on the base member and also a cylindrical seating for a packing between the base and the outer members to inhibit leakage between them in any position of adjustment. The packing may be of rubber like material  
70 in the form of a cup with a tapered edge. It may be secured in position by a flange formed on the inner member which, when screwed in position, clamps the packing with a metal washer to support its central part, the outer  
75 member has a delivery orifice on the axis of the nozzle the orifice being extended inwardly by an internal conical surface which is of the same angle as the cone on the end of the inner member. The outer end of the delivery  
80 orifice may be chamfered.

When the outer member is turned to cause the inner and outer members to move towards each other the coned end of the inner member enters the coned end of the  
85 delivery orifice. In the extreme position the coned surfaces meet leaving only the grooves to carry liquid to the orifice, resulting in the formation of a fine spray. As the outer member is unscrewed to increase the  
90 separation of the coned surfaces the volume and concentration of the spray are increased progressively until a solid jet is delivered.

It is also to be understood that the invention is not limited to the use of a screw to control the axial relative movement of the  
95 inner and outer members and that other equivalent means may be provided for this purpose. The outer member may if desired be made as a sleeve which is adjustable in an axial direction, the position of the sleeve  
100 being controlled manually or locking means may be provided for this purpose.

Dated this 10th day of January, 1949.

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*This Drawing is a reproduction of the Original on a reduced scale*

